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HOT AIR SYRINGE.

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911,687. Patented Feb. 9, 1909.

Fig. 1.

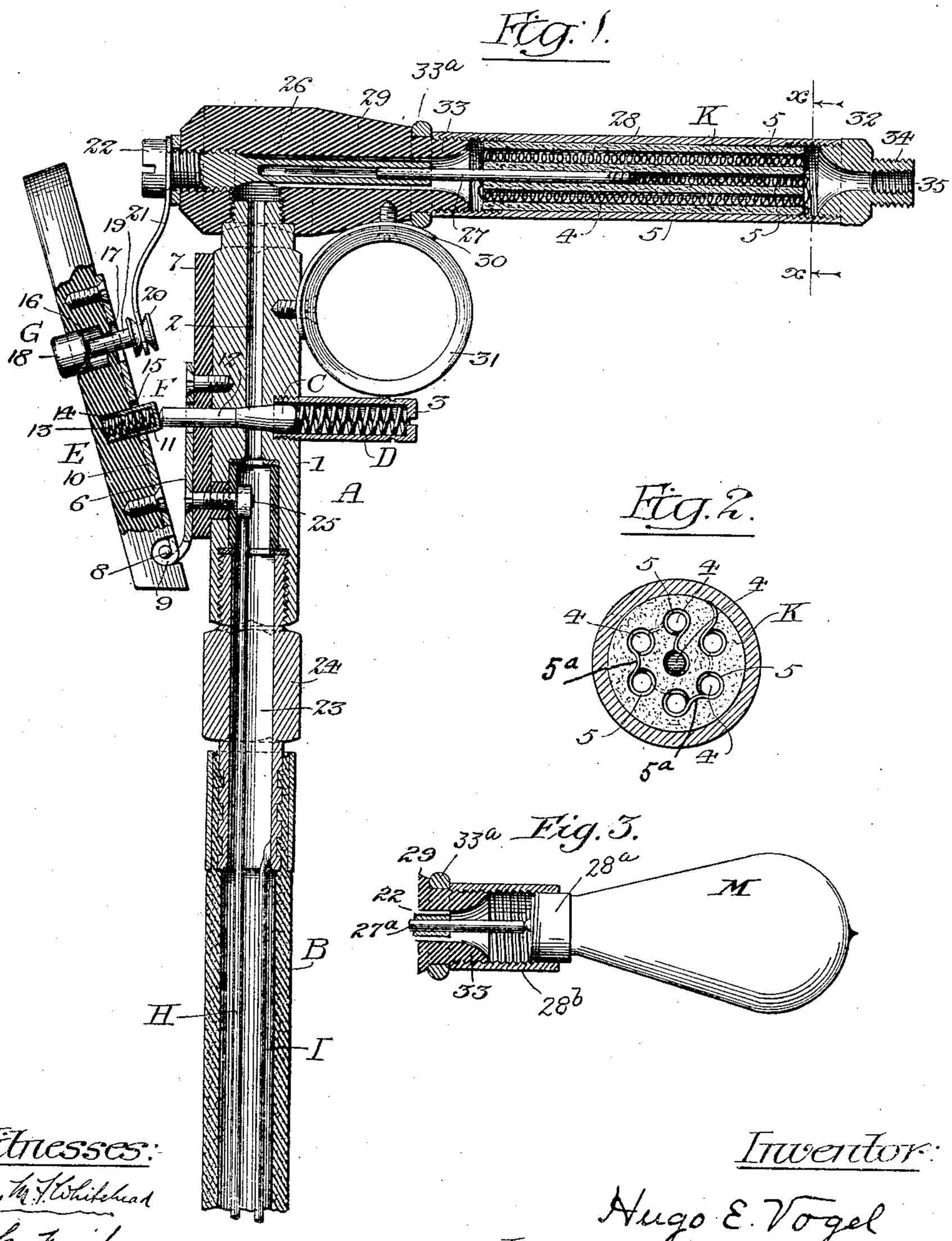

Fig. 2.

Fig. 3.

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HOT-AIR SYRINGE.

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To all whom it may concern:

Be it known that I, HUGO E. VOGEL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hot-Air Syringes, of which the following is a specification.

In a hot air syringe characterized by my invention the air duct is normally closed by a valve which opens against a yielding spring resistance. The appliance is also provided with a lever for opening the valve, a spring resistance between the valve and the lever, and a spring contact member arranged on the lever as a push button, the other contact member being fixed upon the lever. The air passage is at one end portion of the appliance continued by a set of relatively small air passages extending axially through spirally formed heating coils and arranged to discharge into a duct in the nozzle end part of the device. These coils are connected and in metallic circuit with suitable incoming and outgoing wires, a portion of such circuit being through a contact member arranged on the lever which is normally held by the spring valve in position to break the circuit, said lever being provided with a spring follower or cushion against which the valve impinges. When it is desired to use hot air, the lever is pressed forward toward the body of the appliance and against the valve until a yielding but increasing spring resistance on the lever has become a sufficient positive resistance to overcome the resistance of the valve spring, whereupon further forward swing of the lever will open the valve. The forward swing of the lever will also bring the contact member fixed thereon into engagement with the contact member formed by the push button and thereby complete the circuit which includes the heating coils. When it is desired to use only cold air, the operator will move the lever forward to an extent to open the valve, and at the same time hold the push button so that the circuit will remain broken. When desired, the portion containing the heating coils can be removed and an electric lamp bulb substituted therefor. In such case the operator can move the lever forward to an extent to establish the circuit but not to open the valve.

In the accompanying drawing: Figure 1, is a section centrally and longitudinally through a hot air syringe embodying my invention, a portion only of the thumb lever being however shown in section. Fig. 2, is a section through Fig. 1 on line x—x, on a somewhat larger scale. Fig. 3 illustrates the substitution of an electric lamp for the coil heater, the bulb being in elevation and a portion of its connection with the instrument being in longitudinal central section.

The body portion A of my improved hot air syringe is as a matter of mechanical convenience, composed of several component parts or sections suitably fitted together, the structure as a whole being provided with a central longitudinal bore or duct forming an air passage extending from end to end of the body and having its receiving end opening into the passage within a flexible supply pipe B. This supply pipe is attached to one end of the said hollow body and is understood to be adapted for connection with some suitable source of supply of compressed air. Portion 1 of the hollow body is provided with a valve C, which is normally held in position to close the duct or passage portion 2 through the hollow body by means of a spring D arranged within a casing 3 on the body portion 1.

The air passage through one end portion of the body is subdivided into a series of parallel, longitudinal bores 4, which contain heating or resistance coils 5 suitably connected and wound like spiral springs, whereby the coils which fit in the bores 4 provide passages having their walls formed by the spiral coils.

The valve C may be operated to permit a flow of air through the hollow body without establishing the circuit through the coils, when it is desired to use cold air only, and on the other hand, when it is desired to use hot air, the coils can be thrown in circuit. As a further feature, the coils can be thrown in circuit without opening the valve, and in such case an electric lamp can be substituted for the coil heater. The devices shown for carrying out these principles of operation are as follows: E indicates a small thumb or finger lever fulcrumed at one end upon the body portion 1 by a suitable hinge, which as shown, comprises a metal strap 6, secured upon the body portion 1 and insulated by a body 7 of suitable insulating material arranged between the metal strap and the body portion 1, the said strap being at its lower end bent to form an eye, which engages a pintle 8 on the

thumb lever. The pintle 8 is also engaged by an eye portion 9 of a metal plate 10, which is secured upon one side of the thumb lever. The thumb lever is also provided with a spring follower F comprising a cap 11, arranged opposite the stem 12 of valve C and receiving a spring 13, the said spring being seated within a recess 14 in the thumb lever and the cap 11 being arranged to work through an opening 15 in the plate 10, and to move back within the recess 14 when the thumb lever is swung forward to an extent to cause the cap portion of the spring follower F to be forced against the valve stem. It will also be observed that the diameter of the opening 15 is greater than the greatest diameter of the cap 11, whereby the latter does not come in contact with plate 15, which as hereinafter more particularly described is utilized for a portion of the metal circuit. The thumb lever is also provided with a circuit breaker comprising a push button G, arranged to work through a recess 16 in the thumb lever and an opening 17 in the plate 10, said push button being provided with a head 18, which is normally projected to some extent out from the recess 16 at one side of the thumb lever, said head 18 being provided with a stem 19, which extends through opening 17 in the plate 10. The stem 19 of the push button is provided at its outer end with a contact portion 20, which is engaged by a spring 21, the free end of the spring being in engagement with the contact 20, while the opposite upper end of said spring is clamped upon the body portion of the instrument by a screw 22. The push button G is shown in its normal position and it is thus maintained by the spring 21. The recess 16 in the lever is adapted to receive the head of the push button and is continued at one end by a smaller central opening for the push button stem 19. As a way of forming the metallic circuit, the wires H and I are shown arranged within the flexible tubing B, it being understood that said wires are in practice extended and connected with any suitable source of electric supply. The wire H extends from the tube B upwardly within passage 23 of the section or body-portion 24 and at its upper terminal connects with a screw 25, which is suitably insulated by insulating material 7 and connects at its outer end with the metal plate 6. From plate 6 the circuit extends along through plate 10, and when said plate is brought into engagement with the end contact portion 20 of the push button, the circuit will be continued through said contact portion 20, thence through the spring 21, and thence through the screw 22, which has a bore 26 extending back from one end portion and adapted to receive at one end portion a small rod 27, which serves to continue the metallic circuit. The rod 27 connects with the heating coils and to such end the central bore 4 of the series of coil receiving bores is provided with one of said spring-shaped coils into which one end portion of the pin or rod 27 is fitted. The bores 4 for these heating coil portions 5 are formed through a body K of insulating material, such as compressed paper, said body being preferably cylindric and fitted within a metal shell 28, which is at one end detachably screwed upon a threaded end of the body portion 29 of the instrument. It is understood that the coil portions 5 are connected at opposite ends of the body K in alternation, that is to say—the central coil portion connects at the outer end of the body K with one of the coil portions, while the latter connects with another coil portion at the rear end of said body K, the last one of said coil portions being connected with the metal casing 28 to continue the metal circuit.

As a convenient arrangement, the metal circuit is continued from the metal shell 28 to a bent metal plate 30, secured upon the periphery of a finger ring 31, which is in turn secured to the body as a means for permitting the operator to readily hold the instrument with one hand, one or more of his fingers being inserted through the annular finger piece 31, whereby he can manipulate the lever E with his thumb. The metal circuit is continued from plate 30 through the metal body portion 1 of the instrument, and thence to and through the wire I, which is secured to the inner wall of passage portion 23 in the section or body portion 24 of the appliance.

The cylindric shell or casing 28, is provided at its outer end with a hollow detachable end piece 32, having a nipple externally threaded as at 34 and internally threaded as at 35, whereby certain dental tools can be screwed upon the thread 34, while others of different character can be screwed into the threaded portion 35.

As dental tools are of various constructions, and as it is not new to secure a dental tool to one end of a heating device, I have not considered it necessary to show such tools in Fig. 1, it being obvious that tools, tubes or the like can be used.

As illustrated in Fig. 1, passage portion 2 through the body of the instrument is closed by the valve and the circuit is broken by reason of the thumb lever E being swung away from the body portion to the limit of its outward throw, said thumb lever being normally maintained in such position by spring action, and said spring action being preferably obtained by the expansion of spring D, which normally closes the valve and causes the valve stem to project against spring follower F on the thumb lever. If it is now desired to use cold air only, the opera-

tor will press the lever E toward the body of the instrument to an extent to force back and open the valve C, and at the same time he will also use his thumb to press forward the push button G, which forces spring 21 in like direction so as to prevent metal plate 10 on the thumb lever from contacting with the contact end portion 20 of the push button, and as long therefore as the end portion 20 of the push button is thus prevented from making electrical contact with plate 17 on the thumb lever, the circuit will remain broken and the supply of air discharged by the syringe will be cold. When it is desired to supply hot air, the operator will release the push button and press the lever forward until it has opened the valve and brought its plate 10 into contact with end portion 20 of the push button G, it being observed that the spring 21 will normally maintain the push button in position to permit such contact when the lever is thus swung forward. When the thumb lever is swung forward, it does not open the valve during the first or initial portion of its movement, for the reason that its spring follower F, which abuts against the valve stem 12, will yield until it reaches a limit where such yield will cease and thereupon a continuation of the forward movement of the thumb lever will force back the valve against its spring D. When therefore the operator desires to use an electric lamp in place of the shell 28 and resistance coils therein, he will unscrew and remove the shell 28 with its contents and screw upon the threaded end 33 of the body portion 29 (which is made of insulating material) an electric lamp suitably adapted to make contact with the inner end of screw 22 and plate 30 on the ring 31, and when the lamp is thus applied, the operator can press the thumb lever E to an extent to bring its plate 10 into contact with end portion 20 of the push button, and at the same time not open the valve. This substitution of an electric bulb lamp for the heating device is illustrated in Fig. 3 in which M indicates an ordinary electric bulb lamp which can be constructed for attachment to the body portion 29 of the instrument. In this figure a part of the body portion 29 of the instrument is shown, a short ferrule 28^a being screwed upon the end part 33 of the body portion 29, and the lamp socket being fitted in the opposite end of said ferrule 28^a. Connection between the lamp and screw 22 is made by a rod 27^a on the lamp, and the inner end of tube 33 is understood to connect with plate 30 of Fig. 1 when the tube 28^a is screwed upon end 33 of the body portion 29. In Fig. 1 connection between tube 28 and plate 30 is made by a metal ring 33^a screwed on end 33 of the body portion 29, the inner end of tube 28 being in contact with ring 33^a and the latter being in contact with plate 30. When the heater including tube 28 is removed, the tube 28^b is fitted in place of the tube 28, or if desired rod 27^a and tube 28^b may be the rod 27 and tube 28 of Fig. 1, in which case when the lamp is fitted on one end of the tube it will contact with both the tube and the rod.

From the foregoing it will be seen that the normal spring resistance of the valve spring is greater than the normal spring resistance of the spring 13 carried by the lever and hence, that when the lever is swung toward the valve, the spring 13 will be compressed before any compressive action or yield on the part of the valve spring takes place. Also that the spring 13 when thus compressed or forced back, forms a yielding spring resistance and that at a certain point it becomes a resistance sufficient to permit further forward movement on the part of the lever to overcome the resistance of the valve spring and open the valves. When the lever is in normal position as shown, the push button is held out in the position illustrated by the spring 21. When the lever is swung toward the body of the appliance, the push button will be still maintained by spring 21 in the position illustrated, until the contact plate 10 on the lever is brought into engagement with the enlarged end contact portion 20 of the push button, and up to this juncture, the forward movement of the lever will not have opened the valve by reason of the yield of the spring 13.

By arranging the heating coils as shown, the air passing through them will be immediately and satisfactorily heated, and issue therefrom into the hollow detachable threaded end piece 32 upon which any suitable nozzle or the like can be fitted. The heating coil portions are conveniently made like one long coiled spring which is then bent as it is inserted back and forth through the bores 4, the coil being bent at the ends of the bores and drawn out so as to leave the wire connections 5^a illustrated in Fig. 2. By thus multiplying the resistance coil portions, I avoid the use of a rheostat and can use a current of at least one-hundred-and-ten volts.

What I claim as my invention is:

1. A hot air syringe having a duct therethrough for the passage of air; electric heating coil means for heating the air prior to its discharge from the syringe; a spring controlled valve for opening and closing the duct at a point back of the heating coil; a thumb or finger lever for opening the valve; an electric circuit breaker forming part of the coil circuit and operated by said lever; and a spring resistance interposed between the valve and the lever and made weaker than the valve spring and adapted to yield with an increasing resistance during the initial portion of the action of the lever in a direction for opening the valve; the circuit breaker being timed in its action to close the

circuit during the said initial movement of the lever and the valve spring being adapted to hold the valve closed until after the circuit has been thus closed.

2. In a hot air syringe having a duct therethrough for the passage of air; electric heating coil means for heating the air prior to its discharge from the syringe; a normally closed spring controlled valve for opening and closing the duct at a point back of the heating coil; a thumb or finger lever for opening the valve; an electric circuit breaker forming part of the coil circuit and comprising a spring push button supported upon the lever and having a contact portion connected with the circuit portion on the body of the syringe, but normally held away from a contact member which is arranged upon the lever and connected with a circuit portion on the body of the syringe; the contact on the lever being brought into engagement with the contact on the push button when the lever is swung forward and the push button is left in a free condition, while on the other hand, the valve can be opened without making the circuit by holding the push button in relative position to the lever to prevent the contact on the latter from engaging the contact on the push button when the lever is swung forward in a direction to open the valve.

3. In a hot air syringe, a suitable body having a duct extending therethrough for the passage of air and attached at one end to a flexible air conducting tube; a heating coil device arranged for heating the air prior to its discharge from the syringe; conducting wires arranged within the flexible tube and suitably extended and forming a portion of the coil circuit; a spring controlled valve for opening and closing the duct at a point back of the heating coil device; a thumb or finger lever hung upon the body of the syringe and having a spring follower arranged against the valve stem and forming a yielding spring resistance; and a contact or electrical circuit breaker carried by the lever and applied for making and breaking the coil circuit.

4. In a hot air syringe, a suitable body having a duct for the passage of air extending therethrough and constructed with a portion 29 of insulating material; a screw fitted within the body 29; a rod or pin 27 having one end fitted within a bore with which the screw is provided; a body of insulating material having a central longitudinal bore and a series of longitudinal bores around the same; wire coil portions fitted within said bores and a casing inclosing this perforated body of insulated material; the coils being connected and in circuit and one end portion of the rod or pin 27 being fitted within an end portion of the central coil.

5. In a hot air syringe, a body having a duct for the passage of air extending therethrough; an electric heating coil device for heating the air prior to its discharge from the syringe; a valve for opening and closing the duct; a thumb or finger lever for opening the valve; and a circuit breaker comprising a contact on the lever; a push button G, and a spring 21 connecting the push button with the metal circuit.

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